PREFERENCE FOR DIFFERENTIAL EPIBIONT COVERAGE ON LEAVES OF *THALASSIA TESTUDINUM* IN TURTLE GRASS HERBIVORES

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Abstract. (AVB) Many marine herbivores derive nutrients from the epibiont growth on turtle grass, *Thalassia testudinum*, but are thought to be unable to digest the plant tissue itself. We hypothesized that urchins and fish that utilize *Thalassia* epibiont communities would graze more on leaves with epibiont cover than on leaves that had been scraped clean of epibionts. We found that fish grazed significantly more on the blades with epibionts, but that the urchins grazed significantly more on the leaves that had been scraped. This may indicate that some urchins are capable of digesting and utilizing the leaf material in their diet, or it may be due to nutrients released in the scraping process that attracts urchins to their forage.

INTRODUCTION (AVB)

Turtle grass, *Thalassia testudinum*, provides a substrate for a diverse cover of epibionts such as nematodes, copepods, nauplii and algae. It is an important food source for parrotfishes (*Scaridae*) and sea urchins (*Diadema*, *Lytechinus*), which graze on the blades of this grass. Previous studies with isotope tracing have shown that the nutrients taken up by these animals are derived from the epibiont cover and not the from the grass (Fry 1984). This suggests that even though the grass is eaten, the nutrients are taken up primarily from the epibionts, while the grass is not efficiently digested by these organisms. If urchins and parrotfish are in fact grazing the grass solely for nutrients in the epibionts, we hypothesized that they should preferentially graze blades that have higher epibiont cover.

METHODS (MJG)

Our study was conducted on 21 and 22 February 1995 at Discovery Bay Marine Laboratory, Jamaica. On 21 February we collected 120+ ungrazed blades of turtle grass, *Thalassia testudinum*, from the turtle grass beds near the dock area. We cut all collected leaves to a standard length of 12 cm and removed the epibiont growth from half by scraping gently with a razor blade. We tested two treatments, one of leaves with epibionts and one of leaves without epibionts. Each treatment consisted of 60 leaves.

We used a system of bolts and clothespins to attach the turtle grass. We placed 6 blades of turtle grass in each of twenty clothespins. Two clothespins were attached to each of ten bolts. This gave a total of 5 bolts with sixty blades of grass for each treatment. A small vial and flagging tape was tied to each bolt to serve as a buoy to mark the site.

We then placed the bolts randomly in 2 rows of 5, in a turtle grass bed approximately 50 m north of the dock at 1630. The two rows were approximately 1.5 m apart and bolts in the rows approximately 1 m apart.

At 915 on 22 February we removed the blades and analyzed them for amount of herbivory. Because the observed amount of herbivory was so small, it was quantified by number of leaves grazed rather then amount of leaf area removed. It was also classified as either urchin or fish herbivory based on visual examination.

RESULTS (MJG)

There was a significant difference in the amount of herbivory by fish and urchins on epibiont and non-epibiont leaves ($G=39.045$, $df=1$, $P<0.001$). The observed fish grazing on leaves with epibionts was higher than expected, while the observed urchin grazing was higher on leaves without epibionts than expected (Table 1).

Table 1. Number of *Thalassia* blades with and without epibionts grazed by fish vs. urchins.

	Fish	Urchins	Total
Epibionts	1.5	8.5	10
No epibionts	7.5	41.5	49

DISCUSSION (JMH)

We found that fish grazed significantly more on turtle grass with epibionts, supporting previous findings that fish consume turtle grass for the epibiont growth on the leaf surface, rather than for the leaf material itself.

We observed more urchin grazing occurrences than fish grazing occurrences. Ginsburg et al. (1995) found that fish graze significantly more during the day than at night and that there was a trend for increased sea urchins grazing at night than during the day. Our sampling time (1630 to 915) biased our results in favor of the nocturnal and crepuscular grazers, such as urchins. We saw little herbivory by fish, which are predominantly nocturnal grazers.

We found that urchins grazed on turtle grass without epibionts significantly more than on turtle grass with epibionts It is possible that this apparent preference for turtle grass without epibionts indicates that the urchins in the study area are in fact using the grass itself as a source of food. At least one species of urchin, *Lytechinus variegatus* consumes and appears to be able to digest about 1 g of turtle grass per week (Barnes 1987). However, as there is no evidence that urchins can survive utilizing only turtle grass as a nutrient source, we would have expected some grazing on leaves with epibiont coverage.

Another explanation is that our method of scraping the leaves biased our experiment. When the leaves were scraped with a razorblade, the wall of the leaf was often destroyed and the cell contents of the leaf escaped. Because urchins graze predominately at night and have only simple photoreceptors, it is likely that they rely on chemoreception for location of their food source. By scraping the leaves to remove the epibionts, we may have released large quantities of the nutrients that attract urchins to their food source, thereby increasing urchin herbivory on scraped leaves. Further studies should focus on the importance of chemoreception in urchin foraging by comparing urchin herbivory on scraped and non-scraped leaves with similar epibiont coverage.

Our experiment indicates that, during the night and the two crepuscular periods, fish herbivores show a preference for turtle grass with epibiont coverage, while urchin herbivores show a preference for turtle grass scraped of its epibionts. These different preferences may imply that the two herbivore groups have different nutrient requirements. These results may also reflect that fish are visual foragers, while urchins rely on chemoreception.

LITERATURE CITED

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